

# Standard Measures during Spaceflight

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# Experiment Design Overview

## 6-month mission

Pre-flight	In-flight	Post-flight
Actigraphy w/ sleep logs (2 weeks each) (L-180, L-90)	Actigraphy (2 weeks each) (bimonthly)	Actigraphy w/ sleep logs (2 weeks) (R+0)
Personality Survey (anytime preflight)	Sleep Quality/Team Questionnaire (monthly)	Cellular Profile Survey (R+15)
Cognition (L-120 fam, L-90)	Cognition (FD30 & R-30)	Cognition (R+10, R+30)
Cellular Profile (ambient blood, saliva) (L-180, L-90)	Cellular Profile (ambient blood, saliva) (Early mission vehicle return, R-0)	Cellular Profile (ambient blood, saliva) (R+30)
Biochemical Markers (blood, urine) (L-180)	Biochemical Markers (blood only) (FD30, R-30)	Biochemical Markers (blood, urine) (R+30)
Microbiome (body, saliva, fecal) (L-90)	Microbiome (body, saliva, fecal) (FD30, R-30)	Microbiome (body, saliva, fecal) (R+30)
Carotid Intima-Media Thickness (L-180)	N/A	Carotid Intima-Media Thickness (R+5, R+30)
Sensorimotor Measures (L-180, L-90)	N/A	Sensorimotor Measures (R+0 at landing site, R+0 at JSC, R+9)

Crew time: ~7 hours

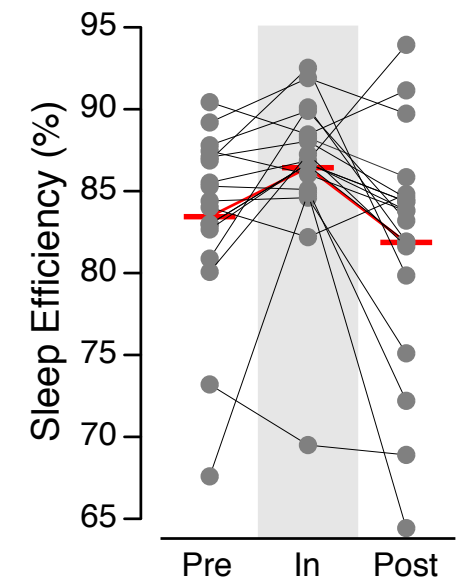
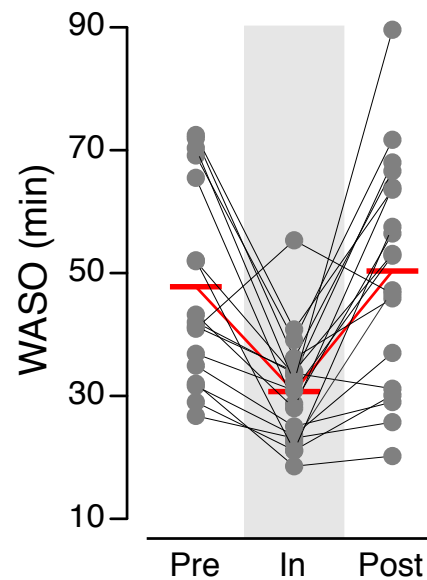
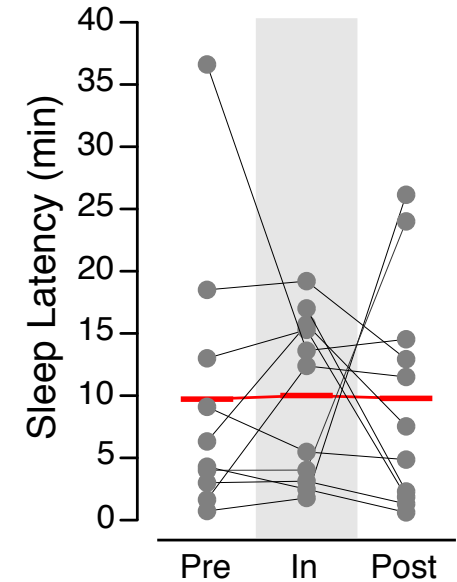
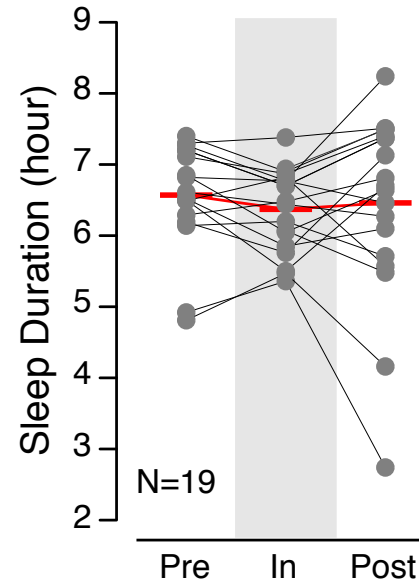
Crew time: ~19 hours

Crew time: ~6 hours

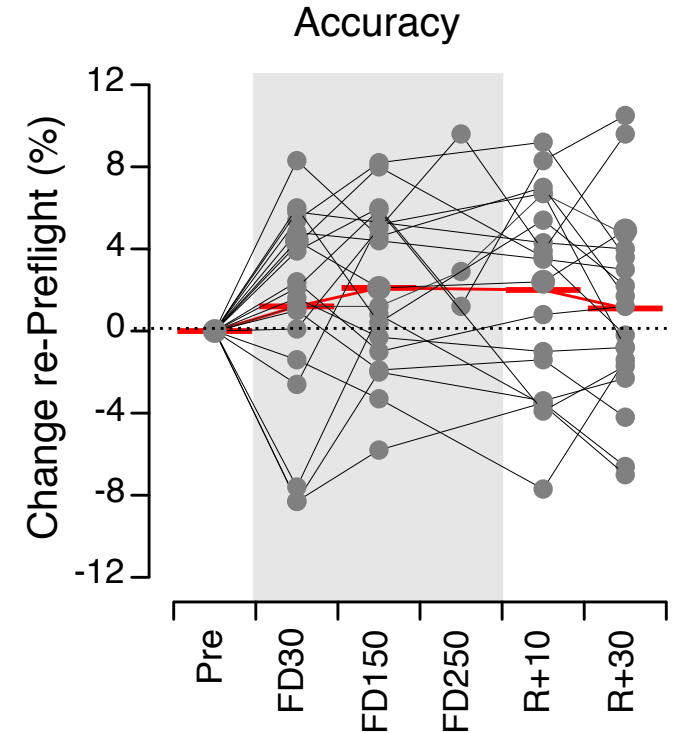
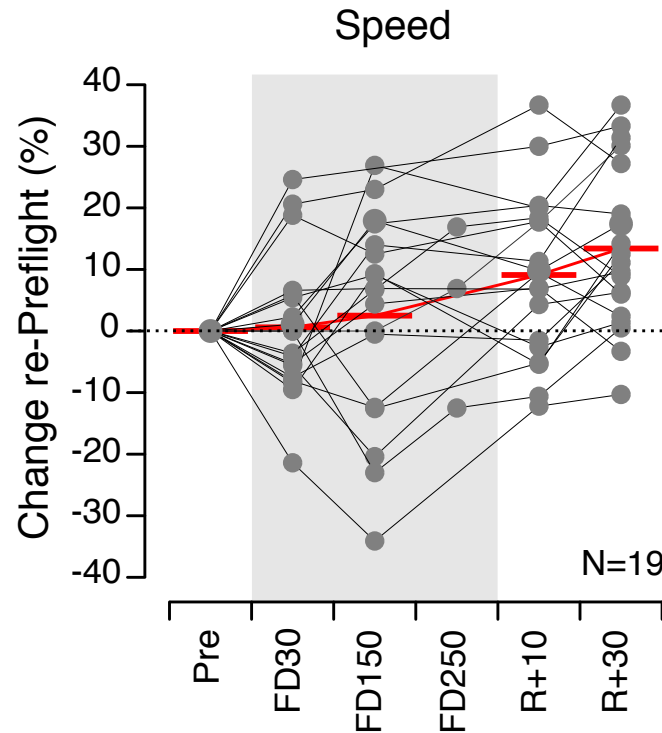
# Results – Sleep



- No changes in sleep duration and latency
- Wakefulness After Sleep Onset (WASO) decreased in-flight
- Sleep efficiency increased in-flight



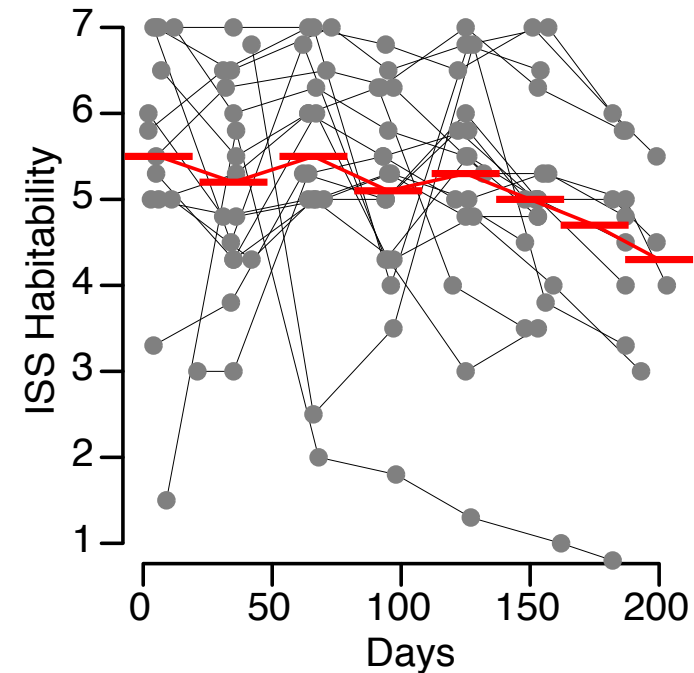
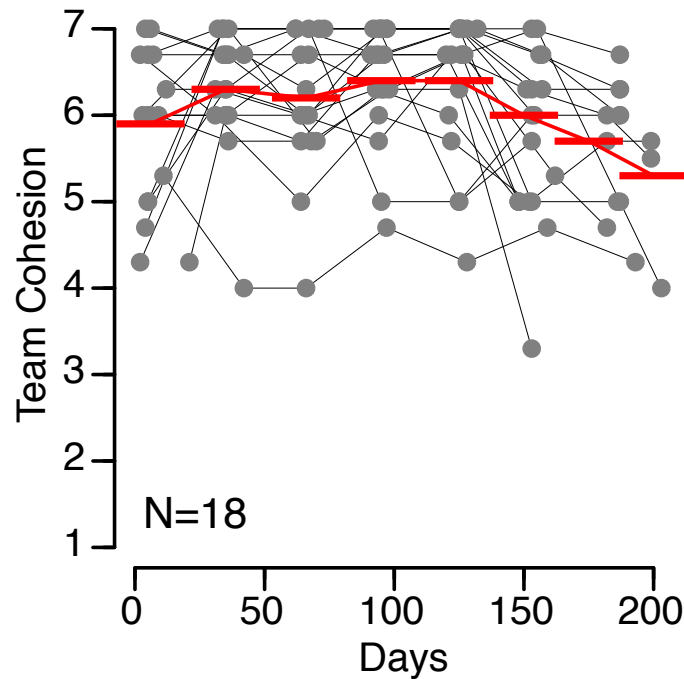
# Results – Cognition



- Execution speed and accuracy increased with the repetition of the tests

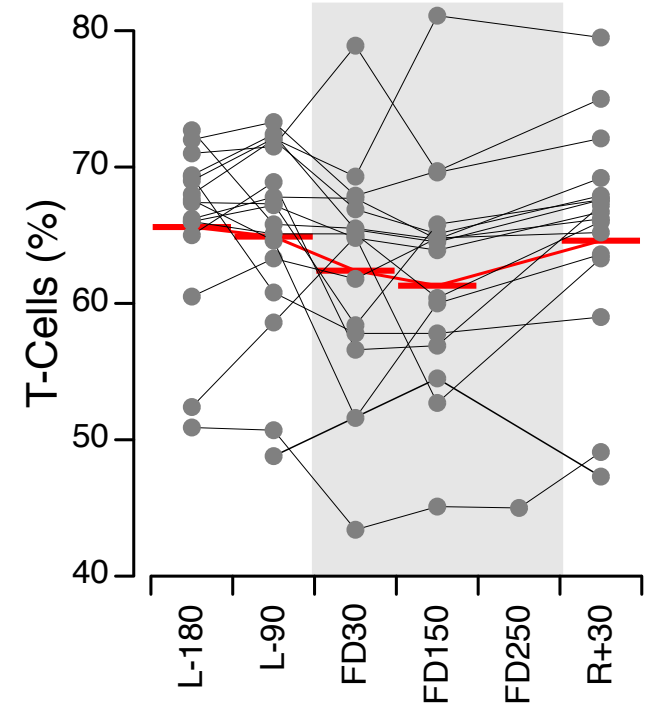
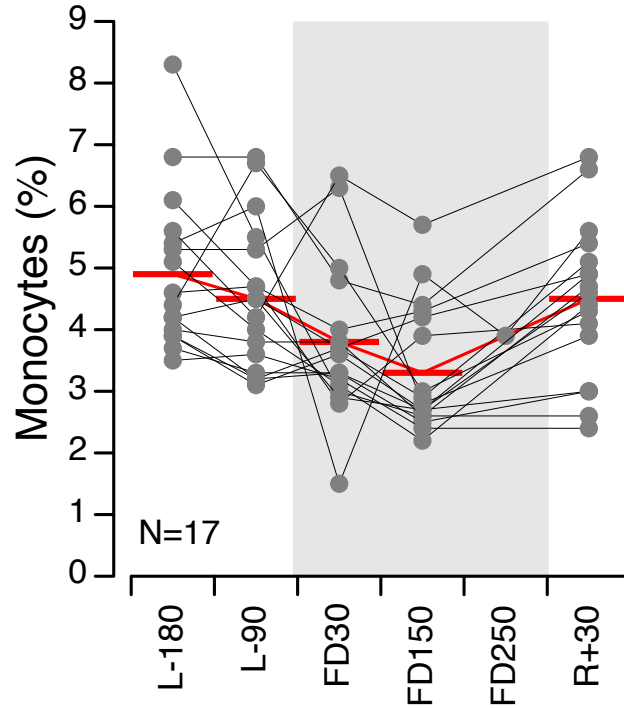
Motor Praxis Test (MP)	Visual Object Learning (VOLT)	Fractal 2-Back (F2B)
Abstract Matching (AM)	Line Orientation Test (LOT)	Emotion Recognition Task (ERT)
Matrix Reasoning Test (MRT)	Digit Symbol Substitution Task (DSST)	Balloon Analog Risk Test (BART)
Psychomotor Vigilance Test (PVT)		

# Results – Team Performance



- Team cohesion and ISS habitability decreased from FD150

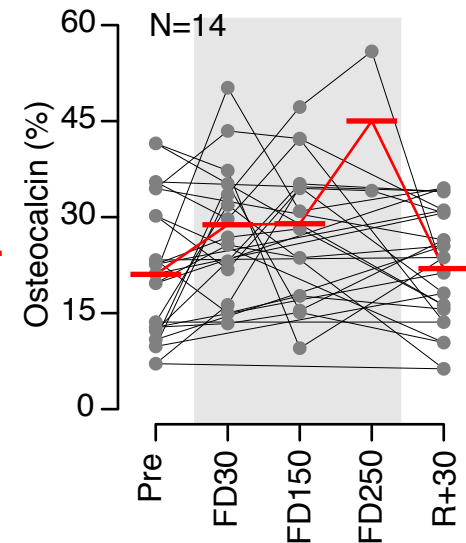
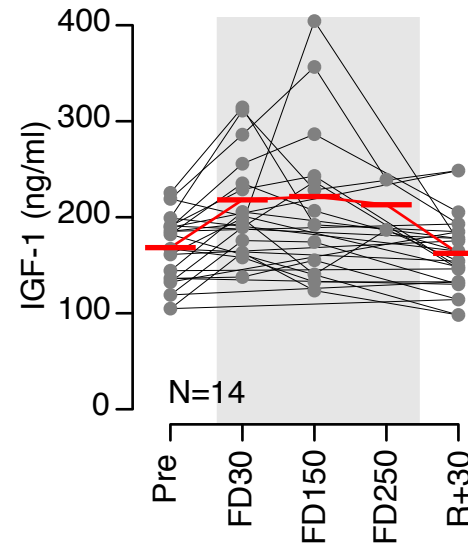
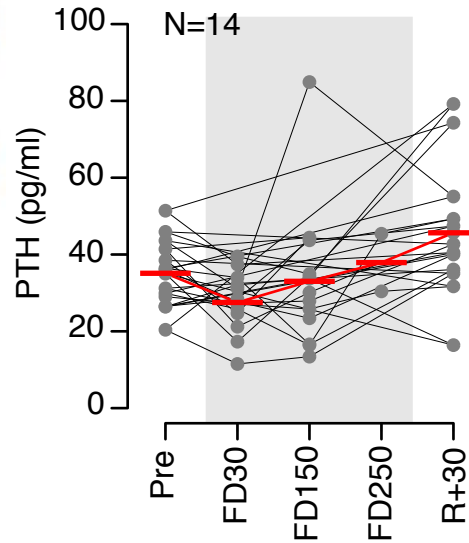
# Results – Cellular Profile



- Monocytes and T-Cells concentration decreased in-flight

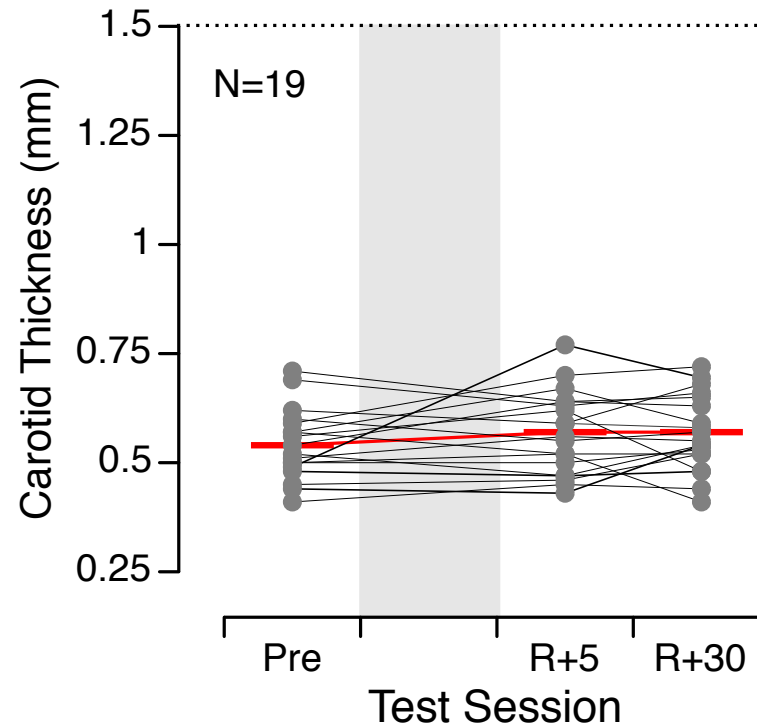


# Results – Biochemical Markers



- Hormone that controls the calcium in the blood (PTH) decreased early in-flight, then increased
- Biomarkers of bone formation (IGF-1, Osteocalcin) increased in-flight

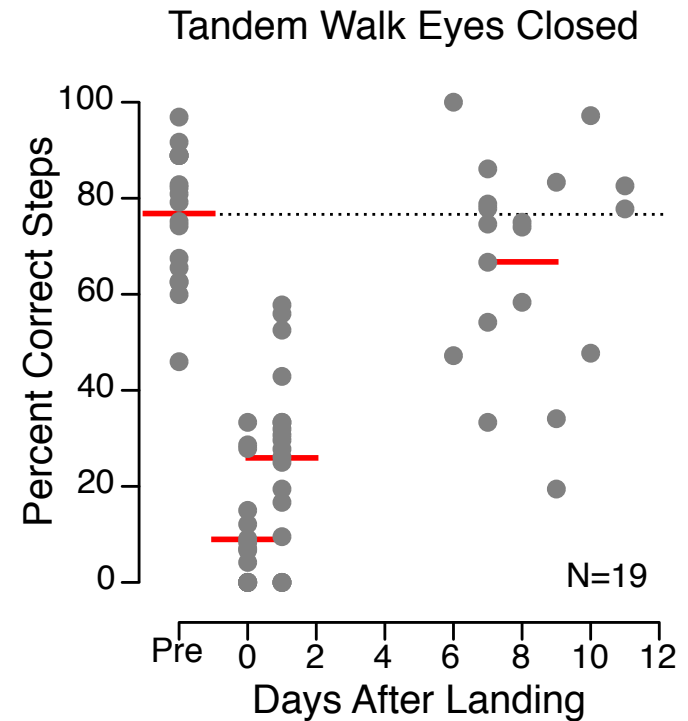
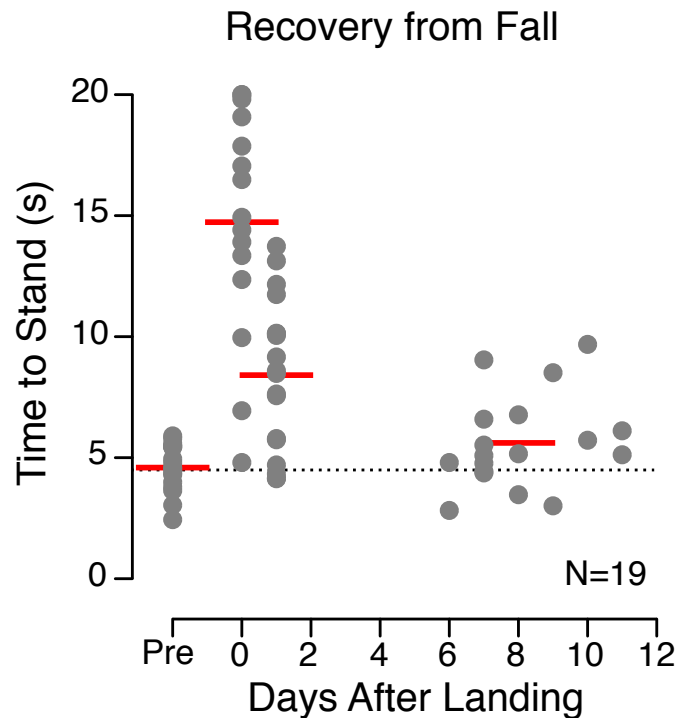
# Results – Carotid Wall Thickness



- No change in carotid intima-media thickness



# Results – Sensorimotor Measures



- Standing from prone had recovered by R+8
- Tandem Walk did not fully recover at R+8

***Spaceflight Standard Measures* constitute a database for:**

- Providing context for data acquired by concurrent experiments
- Supporting or developing hypotheses
- Evaluating the effectiveness of various in-flight countermeasure profiles
- Comparing population responses to various mission durations (6 weeks, 6 months, 1 year)